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"Transforming Maritime Supply Chain of Bangladesh: A Strategic Framework for Modernizing Container Handling Operations"

[This business report is submitted in fulfillment of a partial requirement for the degree of Master of Business Administration with a Major in Operations & Supply Chain Management]

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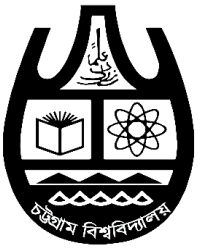

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LETTER OF SUBMISSION

Date: 16 January 2026
Professor Dr. Md Mizanur Rahman Chowdhury
Department of Management
Faculty of Business Administration
University of Chittagong

Subject: Submission of Business Report on **Transforming Maritime Supply Chain of Bangladesh: A Strategic Framework for Modernizing Container Handling Operations**

Sir,
With due respect, it is my privilege and honor to present this business report on "**Transforming Maritime Supply Chain of Bangladesh: A Strategic Framework for Modernizing Container Handling Operations"** under your guidance, which I am submitting as a partial requirement of the MBA program.
This comprehensive study examines the critical vulnerabilities affecting Bangladesh's maritime supply chain at Chattogram Port. Using Christopher Martin's risk framework, I have analyzed supply, demand, process, control, and environmental risks through survey data from shipping companies and terminal operators, along with detailed secondary research.
I have sincerely tried to prepare this report according to your guidance and suggestions. Working on this important topic about Bangladesh's trade sector has been a great learning experience for me.
I am ready to provide any clarification or explanation about the findings and recommendations in this report.
Despite my sincere efforts to maintain accuracy throughout this work, some unintentional errors may remain. I would be grateful for your kind understanding and consideration in such cases.
Thank you for giving me the opportunity to work on this important subject.

Respectfully Yours,
Abdul Ahad Sadim
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All praise and gratitude belong to the Almighty Allah, whose infinite mercy and wisdom have granted me the knowledge, capability, and opportunity to complete this report.

I owe my sincere gratitude to Professor Dr. Md. Mizanur Rahman Chowdhury, Department of Management, University of Chittagong, whose intellectual guidance, and thoughtful insights shaped the direction of this work. His mentorship has been instrumental in developing both my analytical thinking and professional capabilities.

This study would not have been possible without the generous cooperation of industry practitioners from shipping lines, terminal operations, and container handling sectors who participated in my survey. Though their contributions remain anonymous, their candid perspectives on operational challenges and strategic priorities provided the empirical foundation for this analysis. Their willingness to share real-world experiences brought authenticity and depth to this work.

I am also indebted to the authors, scholars, and industry experts whose frameworks and insights informed the conceptual foundations of this report.

Finally, my appreciation extends to all those who, in ways both visible and subtle, contributed to the completion of this work.

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SUPERVISOR'S CERTIFICATE

Date: 16 January 2026

This is to certify that Abdul Ahad Sadim (ID: EV233072068), a student of the 23rd batch MBA program at Chittagong University Center for Business Administration (CUCBA), has successfully completed the business report titled "**Transforming Maritime Supply Chain of Bangladesh: A Strategic Framework for Modernizing Container Handling Operations**" under my academic supervision and guidance.

The student has made sincere efforts in aanalyzing the operational challenges of Bangladesh's maritime supply chain. This work demonstrates a reasonable understanding of supply chain risk management concepts and their practical application.

I expect that the knowledge and insights gained through this work will serve him well in his professional career.

Professor Dr. Md. Mizanur Rahman Chowdhury
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STUDENT'S DECLARATION

I, Abdul Ahad Sadim, ID: EV233072068, hereby declare that the business report titled: **"Transforming Maritime Supply Chain of Bangladesh: A Strategic Framework for Modernizing Container Handling Operations"** has been prepared by me as a requirement for the Master of Business Administration degree at the Chittagong University Center for Business Administration (CUCBA), University of Chittagong.

I further declare that: This report is based on my sincere effort, study, and analysis of Bangladesh's maritime supply chain operations at Chattogram Port.
The primary data presented here was collected through surveys conducted with industry practitioners from shipping companies and terminal operators.
The work presented here is original and has not been submitted, in full or in part, to any other academic institution for any degree, diploma, or certificate.
All sources of information, data, and theoretical frameworks used in this report have been duly acknowledged and properly cited.

I hereby confirm that all information contained in this report is true, accurate, and complete to the best of my knowledge.

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EXECUTIVE SUMMARY

In this report my focus is to analyze the systemic vulnerabilities affecting Bangladesh's maritime supply chain operations at Chattogram Port, applying Christopher Martin's five-dimensional risk framework to identify critical challenges and develop strategic pathways for competitive improvement. The study is based on primary survey data I gathered from shipping companies and terminal operators, supplemented by operational statistics from Chattogram Port Authority, government publications, and industry reports.

The journey begins with collecting data on Bangladesh's strategic maritime positioning and the critical role of Chattogram Port, which manages approximately 90% of the country's international trade. This report's main focus was to develop a comprehensive theoretical framework, integrating supply chain risk management theory, port operations efficiency models, and governance frameworks. This foundation facilitates my systematic assessment of supply, demand, process, control, and environmental risks affecting maritime logistics performance.

After careful analysis, I observe a complex vulnerability profile characterized by compounding risks across all five dimensions. Critical supply risks include severe port congestion, significant draft depth limitations compared to regional standards, and outdated infrastructure resulting in substantially longer vessel turnaround times than regional competitors. Process risks manifest through extensive customs clearance delays, fragmented governance across multiple agencies, and inadequate digital integration. Control risks are particularly concerning, with survey respondents consistently identifying corruption as a critical operational challenge and universally reporting impacts from political disruptions. Environmental risks include suboptimal management practices and long-term climate vulnerabilities from sea-level rise.

Survey data I gathered consistently identifies three critical constraints as the primary binding factors: draft depth limitation, customs inefficiency, and port congestion. These fundamental constraints create cascading challenges throughout the maritime ecosystem, significantly increasing logistics costs and undermining Bangladesh's export competitiveness.
My aim was to provide strategic recommendations prioritizing draft deepening, implementation of digital single-window systems for customs integration, acceleration of private terminal development with concurrent governance reforms, and climate resilience investments. These interventions address root causes rather than symptoms and aspire to create multiplicative rather than additive improvements.

In conclusion, my study suggests that Bangladesh's maritime sector requires systemic transformation rather than incremental adjustment. With coordinated intervention across infrastructure, governance, and technology dimensions, Chattogram Port can evolve from a competitive constraint into a strategic advantage, supporting Bangladesh's economic growth and regional competitive.

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CHAPTER 1: INTRODUCTION AND ORIGIN OF THE STUDY

1.1 THE STRATEGIC IMPORTANCE OF THE MARITIME SECTOR FOR BANGLADESH'S ECONOMY (GEOGRAPHICAL AND STRATEGIC POSITIONING)

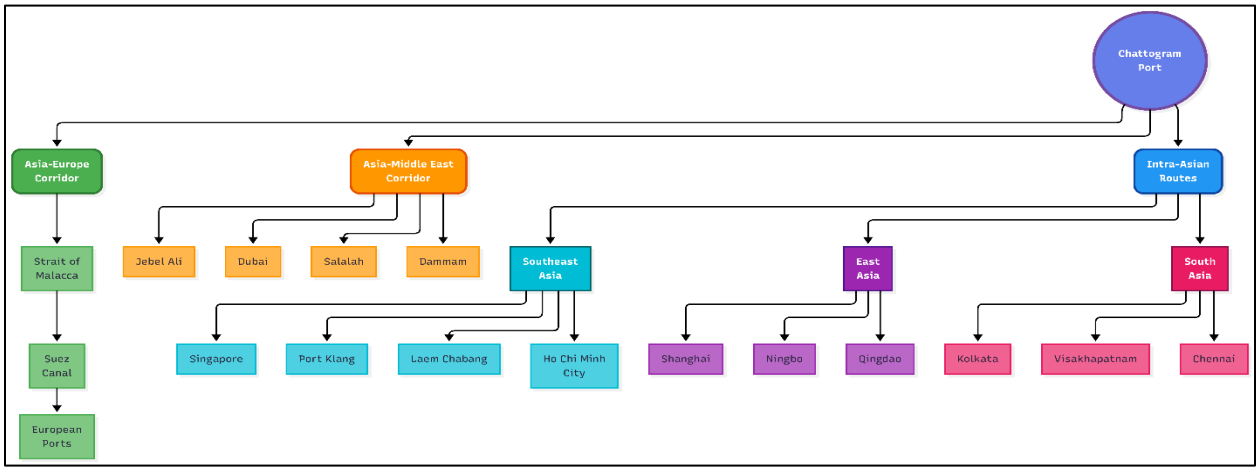
Bangladesh's geographical position where the Bay of Bengal meets the Indian Ocean creates both strategic opportunity and operational complexity for international maritime trade. The nation's territorial waters, covering 118,813 square kilometers secured through the United Nations Convention on the Law of the Sea (UNCLOS) arbitration process in 2009, represent a maritime jurisdiction extending 200 nautical miles into the exclusive economic zone. This territorial acquisition fundamentally altered Bangladesh's economic outlook, establishing maritime logistics not just as a facilitating function but as a strategic pillar of national economic development.

The Bay of Bengal, with its strategic location connecting major Asian markets including India, China, Southeast Asia, and the Middle East, positions Bangladesh as a natural transit point for international maritime trade. The port of Chattogram, located at the junction of the Karnaphuli River and the Bay of Bengal, has historically served as a major maritime hub.

Shipping route from Chattogram Port

The port's strategic location provides access to major international shipping routes, including:

- **Asia-Europe corridor:** Linking Chattogram with major European ports via the Strait of Malacca and the Suez Canal.
- **Asia-Middle East corridor:** Connecting directly to key Gulf hubs including Jebel Ali, Dubai, Salalah, and Dammam.
- **Intra-Asian regional routes:** Serving Singapore, Port Klang, Laem Chabang, Ho Chi Minh City, Shanghai, Ningbo, Qingdao, and Indian ports such as Kolkata, Visakhapatnam, and Chennai.



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This strategic positioning creates significant economic opportunity for Bangladesh, as maritime trade flows through the region generate employment, foreign exchange earnings, and economic development opportunities. However, strategic positioning alone is insufficient to ensure maritime competitiveness. The realization of maritime economic potential requires effective port infrastructure, efficient supply chain operations, skilled workforce, and supportive governance frameworks.

1.2 ECONOMIC SIGNIFICANCE OF MARITIME TRADE

Approximately 90 percent of Bangladesh's export and import trade flows through seaborne transport, making the efficiency and reliability of maritime supply chains directly determinative of national competitiveness in global markets. This extraordinary dependence on maritime transport reflects the geography of Bangladesh, which lacks significant land borders with major trading partners and relies on maritime routes for international commerce.

Chattogram Port Performance (Full Year 2025)

Metric	2025 Data	YoY Growth
Container Throughput	3,409,069 TEUs	+4.07%
Cargo Volume	138.15 million tonnes	+11.43%
Vessel Calls	4,273 vessels	+10.50%

Despite high maritime dependency, Bangladesh's logistics sector underperforms regional benchmarks:

Logistics Performance Indicators - Regional Comparison

Indicator	Bangladesh	Regional Avg	Gap
Trade via maritime (%)	90%	85-92%	Normal
Logistics cost (% GDP)	13-14%	8-10%	+40-50%
LPI Ranking (2023)	88th	Top 50	-38
Avg. port dwell time	12-15 days	3-5 days	+300%
Container handling cost	$450/TEU	$280-320/TEU	+50%

Sources: World Bank LPI 2023, Industry survey data (N=10), CPA statistics 2024-25

This cost differential represents an estimated $511 million annual economic loss, based on the 2025 container throughput of 3.41 million TEUs. This directly impacts Bangladesh's $39.35 billion Readymade Garment (RMG) export competitiveness. The Bangladesh freight and logistics market was valued at USD 31.97 billion in 2025, with projections indicating growth to USD 37.30 billion by 2026. The maritime segment is approximately 40–45 percent of the total logistics market value.

1.3 COMPETITIVE POSITIONING AND PERFORMANCE GAPS

Despite growth, operational inefficiencies persist. Chattogram Port ranks 68th on Lloyd's List of the world's top 100 container ports (2025 edition), compared to Colombo (28th), Laem Chabang (20th), and Jawaharlal Nehru Port (31st).

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These gaps reflect structural vulnerabilities in infrastructure, governance, technology, and workforce capacity.

Port Operational Performance Comparison:

Metric	Chattogram	Colombo	Laem Chabang	JNPT
Vessel Turnaround	3–4 days	1.5–2.5 days	1.5–2.5 days	1.8–3.5 days
Customs Clearance	10–12 days	~1 day	1–3 days	<2 days

These inefficiencies impose significant financial costs through demurrage and detention charges, extended supply-chain lead times, and reduced vessel utilization efficiency.

1.4 PROBLEM STATEMENT AND OBJECTIVE OF THE REPORT

1.4.1 PROBLEM STATEMENT:

Despite playing a pivotal role in Bangladesh's trade ecosystem, the logistics sector suffers from deep rooted inefficiencies that drive up costs and undermine the country's global competitiveness. The country's Logistics Performance Index (LPI) ranking indicates substantial deficiencies in areas such as infrastructure and customs. This report specifically addresses the vulnerability of Bangladesh's maritime supply chain to unmitigated strategic risks. To systematically tackle these challenges, the report adopts Christopher Martin's risk categorization framework from his work on Logistics and Supply Chain Management, which classifies risks into five distinct groups, each with specific characteristics and mitigation strategies.

1.4.2 OBJECTIVES OF THIS REPORT

This study pursues the following three key objectives:

1. To systematically map journey through Chattogram Port for both import and export flows, identifying critical operational bottlenecks across vessel operations, documentation processes.
2. To conduct a structured risk assessment of Bangladesh's maritime supply chain operations at Chattogram Port by applying Christopher Martin's five-dimensional risk classification framework.
3. To develop evidence-based strategic recommendations for improving efficiency container operation.

Together, these objectives provide a diagnostic foundation, systematic risk analysis, and practical strategic guidance to enhance Chattogram Port's efficiency and competitiveness.

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1.5 REPORT SCOPE AND LIMITATION

1.5.1 REPORT SCOPE

This study focuses specifically on container operations at Chattogram Port, examining risks from the perspective of two primary stakeholder groups: Shipping companies/Agent and Terminal Operator. These stakeholder groups were selected because they represent core supply chain operators directly exposed to port operational risks and governance challenges.

1.5.2 LIMITATION

This scope limitation reflects the report's focus on container operations rather than the full spectrum of customs clearance services. This report acknowledges that port operations represent only one segment of the broader maritime supply chain, which encompasses vessel operations, shipping line management, and international logistics coordination. This study does not examine vessel operations, international shipping line management, or inland transportation logistics beyond the port interface. This scope limitation reflects its focus on port-centric supply chain risks rather than comprehensive maritime supply chain analysis. Apart from that, this study acknowledges several important limitations that affect the generalizability and applicability of findings.

- First, this report information is limited to container operations at Chattogram Port and may not be generalizable to other ports in Bangladesh (Mongla Port, Payra Port) or other maritime sectors (general cargo, bulk cargo, tanker operations).
- Second, the study is limited to two stakeholder groups (shipping companies/agent and terminal operator) and does not include perspectives from government agencies, port workers, or end customers.
- Third, the data is limited to a single point in time (October-November 2025) and does not capture temporal dynamics or long-term trends in supply chain performance.
- Fourth, for this report, information based qualitative interviews does not include observational data or experimental research designs.

1.6 SIGNIFICANCE OF THE STUDY

This study will contribute to both academic knowledge and practical policy formulation in several ways:

- Academic Contribution: Christopher Martin's risk classification framework to a developing country’s maritime context with integration supply chain management theory with institutional economics and development studies.
- Practical and Policy Formulation Contribution: Suggest actionable insights to policymakers to identify and priorities key operational risks faced by shipping agents and container carriers.
- Provides empirical evidence on port operational challenges in South Asian emerging economies.

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CHAPTER 2: INDUSTRY OVERVIEW OF BANGLADESH MARITIME LOGISTICS SECTOR

Bangladesh's maritime logistics sector serves as the critical backbone of the nation's trade infrastructure, facilitating over 90% of international cargo movements. As of December 2025, the freight and logistics market is valued at USD 31.97 billion, with projections indicating growth to USD 37.30 billion by 2026.In 2025, Chattogram Port, the nation's primary maritime gateway, handled 3,409,069 TEUs of containers, 138.15 million tonnes of cargo, and recorded 4,273 vessel calls, marking significant year-on-year growth across all key indicators [1]. This chapter provides a comprehensive analysis of the operational landscape, market structure, and strategic developments shaping Bangladesh's maritime logistics ecosystem.

2.1 MARKET VALUATION AND GROWTH PROJECTIONS

The Bangladesh freight and logistics sector represents a strategic economic pillar, enabling the nation's integration into global supply chains and supporting industrial expansion. The market encompasses multimodal transport infrastructure including maritime, air, rail, and road networks, with maritime logistics supporting dominant positioning. According to Mordor Intelligence, the expected market growth for this segment is as follows:

Year	Market Value (USD Billion)
2025	31.97
2026 (Projected)	37.30

The projected annual growth rate (CAGR) between 2025 and 2026 is approximately 16.67%, reflecting steady expansion driven by export diversification, manufacturing growth, and enhanced logistics infrastructure.

2.1.1 CONTAINER TRAFFIC PERFORMANCE AND FORECASTS

Container port throughput serves as a key indicator of trade velocity and economic activity. According to the Chattogram Port Authority, Bangladesh's container traffic demonstrates robust growth momentum:

Chattogram Port Performance Metrics (Full Year 2025)

Performance Indicator	Volume	YoY Growth Rate
Container Throughput	3,409,069 TEUs	+4.07%
Total Cargo Volume	138.15 million metric tonnes	+11.43%
Vessel Calls	4,273 vessels	+10.50%

Growth Drivers are:
RMG export expansion, pharmaceutical sector development, and Increasing Import Demand

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2.1.2 STRUCTURAL GROWTH CATALYSTS

Bangladesh's logistics market is expanding rapidly, driven by interconnected macroeconomic and sectoral developments.

Primary Growth Drivers:

- Export Sector Diversification
    - Ready-Made Garments (RMG): USD 39.35 billion (FY2024-25), maintaining position as primary export category.
    - Leather and leather goods: Growing value-added product exports.
    - Pharmaceuticals: Expanding regional and international market penetration
    - Agro products: Emerging export potential in frozen foods and processed goods
- Foreign Direct Investment (FDI) Inflows
    - Manufacturing sector investments driving cargo generation.
    - Infrastructure development projects require logistics support.
    - Special Economic Zones are creating new trade nodes.
- Domestic Consumption Growth
    - Increasing import demand
    - Urbanization driving consumer goods distribution requirements.
- Regional Supply Chain Integration
    - Strategic geographic positioning between South and Southeast Asia
    - Potential development as regional logistics hub
    - Bay of Bengal Initiative for Multi-Sector Technical and Economic Cooperation (BIMSTEC) corridor opportunities

2.2 CHATTOGRAM PORT: GATEWAY INFRASTRUCTURE AND OPERATIONAL ANALYSIS

2.2.1 STRATEGIC POSITIONING AND TRAFFIC CONCENTRATION

Chattogram Port (formerly Chittagong Port) functions as Bangladesh's principal maritime gateway, commanding approximately 92% of the nation's containerized trade flows. Administered by the Chattogram Port Authority (CPA), a government statutory body, the port operates multiple terminals through both public management and private concession arrangements.

The port's operational efficiency directly impacts Bangladesh's trade competitiveness, logistics costs, and supply chain reliability.

Port Governance Structure:

- Primary operator: Chattogram Port Authority (CPA)
- Emerging model: Public-private partnership (PPP) through terminal concessions
- Regulatory oversight: Ministry of Shipping, Government of Bangladesh

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2.2.2 INFRASTRUCTURE CAPACITY ANALYSIS: DRAFT DEPTH AS CRITICAL CONSTRAINT:

- **Comparative Analysis:**
  Chattogram Port faces structural limitations that significantly impact operational efficiency and cost competitiveness when benchmarked against regional competitor ports. These constraints create cascading effects throughout Bangladesh's supply chain.
- **Draft Depth Limitation:**
  The most critical constraint is the port's maximum draft depth of 9.5 meters, which restricts vessel size and causes reliance on costly feeder services.

2.2.3 PRIVATE TERMINAL CONCESSIONS AND CAPACITY ENHANCEMENT STRATEGY

Bangladesh has strategically embraced private sector participation through terminal concession agreements. This represents a paradigm shift from purely public operation toward hybrid governance models common in successful regional ports.

Strategic Rationale for Private Participation:

- Capital investment for infrastructure modernization.
- Technology transfer and operational best practices
- Professional management and accountability mechanisms
- Workforce development and skill enhancement
- Performance-based service delivery

Major Terminal Concession Agreements (2024-2025)

Operator	Terminal	Investment (USD)	Annual Capacity
APM Terminals (Maersk)	Laldia Container Terminal	$550 million	800,000-1,000,000 TEUs
Red Sea Gateway Terminal (RSGT)	Patenga Container Terminal	Undisclosed	Expansion capacity
DP World (UAE)	New Mooring Container Terminal	Undisclosed	1.47 million TEUs/year

Expected Impact on Port System Capacity:

The aggregate effect of these investments' positions Chattogram to manage projected demand growth:

- Current Capacity (2025): Approximately 3.2-3.5 million TEUs
- Projected Capacity (2028-2030): 5-6 million TEUs with private terminal operations fully commissioned.
- Capacity Utilization: Expected to decrease from current 85-90% to optimal 70-75%

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2.3 MARKET STRUCTURE AND CONNECTIVITY CONSTRAINTS

2.3.1 INDUSTRY CONCENTRATION AND COMPETITIVE DYNAMICS

The international container shipping industry serving Bangladesh demonstrates high concentration characteristic of a combined global market.

Market Structure Characteristics:

- **Capital Intensity:** Container shipping requires substantial fixed capital investment in vessels, creating significant barriers to entry.
- **Economies of Scale:** Larger vessels achieve lower per-TEU operating costs, favoring consolidation.
- **Network Effects:** Comprehensive service networks create competitive advantages and make it difficult for smaller operators to replicate.
- **Alliance Structures:** Major carriers cooperate through vessel-sharing agreements and operational alliances while competing on service and pricing.

2.3.2 FEEDER NETWORK DEPENDENCY: STRUCTURAL COST DISADVANTAGE

Due to Chattogram Port's 9.5-meter draft limitation, Bangladesh relies exclusively on feeder vessel networks rather than direct mainline calls. The operational model requires transshipment through regional hubs (primarily Colombo and Singapore) where cargo transfers between large mainline vessels (8,000-24,000 TEU capacity serving major Asia-Europe and transpacific routes) and smaller feeder vessels (2,000-4,500 TEU capacity) serving Bangladesh.

This structural dependency creates quantifiable competitive disadvantages:

- **Extended transit time**: +35 days compared to direct mainline calls.
- **Cost premium:** +1520% per TEU due to additional handling and transfer operations
- **Schedule reliability**: Reduced due to dependency on hub port connections and multiple vessel transfers.
- **Service frequency:** Constrained by limited feeder vessel capacity compared to mainline routes.

Feeder Network Dependency:

The Bangladesh maritime connectivity model operates through a three-tier hub-and-spoke structure:

- **Primary Model:** Transshipment through regional hub ports (Colombo, Singapore, Port Klang) where cargo is transferred between mainline and feeder vessels.
- **Vessel Types:** Smaller feeder vessels (less than 200 feet long) with capacity of 2,000-4,500 TEUs shuttle between Chattogram and transshipment hubs

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- **Mainline Connection:** Large container ships (8,000-24,000 TEU capacity) serving major Asia-Europe and transpacific routes connect at hub ports, with cargo combined or distributed for onward movement.

Service Delivery Methods:

Shipping lines employ three operational approaches to provide Bangladesh connectivity:

- **Direct Feeder Services**: Carriers use their own dedicated feeder vessels on Chattogram routes.
- **Slot Sharing Agreements**: Carriers purchase space on other operators' vessels to maintain service frequency without deploying their own tonnage.
- **Specialized Feeder Operators**: Third-party feeder specialists (such as X-Press Feeders) provide connectivity services under charter or space purchase arrangements.

Service Route Patterns:

The primary connectivity routes linking Bangladesh to global markets operate through established transshipment corridors:

- Asia-Bangladesh Routes:
  - China (Shanghai, Ningbo, Shenzhen) ↔ Colombo/Port Klang ↔ Chattogram
  - Singapore ↔ Chattogram (direct feeder service)
  - Hong Kong ↔ Colombo ↔ Chattogram
- Europe-Bangladesh Routes:
  - Europe (Rotterdam, Hamburg, Antwerp) ↔ Colombo/Port Klang ↔ Chattogram
  - Mediterranean ↔ Colombo ↔ Chattogram
- Middle East-Bangladesh Routes:
  - Dubai/Jebel Ali ↔ Chattogram (direct service)
  - Middle East Gulf ↔ Colombo ↔ Chattogram

Operational Impact:

This transshipment-dependent model creates several structural disadvantages for Bangladesh's trade competitiveness:

- **Extended Transit Time:** Transshipment adds 3-5 days to total transit time compared to direct vessel calls.
- **Increased Costs:** Per-unit transportation costs are approximately 15-20 percent higher due to additional handling and transfer operations.
- **Schedule Reliability:** Dependency on hub port connections reduces schedule reliability and increases vulnerability to disruptions at transshipment points.
- **Service Frequency:** Limited feeder vessel capacity constrains service frequency compared to mainline routes serving deep-water ports.

Feeder dependency represents a structural constraint that will persist until draft depth improvements enable Chattogram Port to accommodate larger vessels with direct international connectivity, eliminating the need for transshipment through regional hubs.

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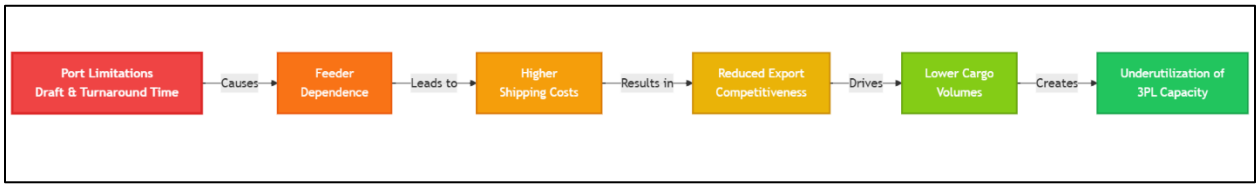
2.4 MARKET INTEGRATION AND FUTURE OUTLOOK

Bangladesh's maritime logistics sector functions as an integrated ecosystem where performance at each level impacts overall competitiveness:

Cascade Effect of Port Constraints:

Port limitations (draft, turnaround time) → Feeder dependence → Higher shipping costs → Reduced export competitiveness → Lower cargo volumes → Underutilization of 3PL capacity



Positive Feedback from Private Investment:

Terminal concessions → Improved efficiency → Lower dwell times → Reduced logistics costs → Enhanced trade competitiveness → Increased cargo volumes → ROI for terminal operators

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CHAPTER 3: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

This chapter establishes the theoretical foundations underpinning the analysis of Bangladesh's maritime supply chain vulnerabilities. The framework integrates multiple theoretical perspectives from supply chain management, risk assessment, and operational efficiency literature to create a comprehensive analytical lens for understanding systemic vulnerabilities and strategic interventions.

3.1 SUPPLY CHAIN VULNERABILITY AND RESILIENCE: THEORETICAL FOUNDATIONS

3.1.1 DEFINING SUPPLY CHAIN VULNERABILITY

Contemporary supply chain management theory recognizes that organizations operate within complex, interconnected networks characterized by inherent vulnerabilities to disruption. The Cranfield University study, conducted for the UK government, defines supply chain vulnerability as "an exposure to serious disturbance, arising from risks within the supply chain as well as risks external to the supply chain." This definition establishes that vulnerability encompasses both internal organizational factors and external environmental factors beyond organizational control.

Vulnerability differs conceptually from risk. Risk encompasses both the probability of adverse events and their potential consequences. Vulnerability, in contrast, focuses on exposure to disturbance without necessarily quantifying probability or consequence. This distinction is important because some supply chain vulnerabilities may have low probability but extremely high consequences, making them critical despite low probability.

3.1.2 SOURCES OF SUPPLY CHAIN VULNERABILITY

Christopher's (2022) identifies five fundamental drivers of increased supply chain vulnerability in contemporary business environments:

- Efficiency focuses on effectiveness, driving inventory minimization and JIT practices.
- Globalization extends supply networks across multiple jurisdictions and geopolitical risk zones.
- Lean practices reducing flexibility and recovery capability.
- Outsourcing transferring operational control to external suppliers; and
- Supplier base consolidation increases concentration risk.

These drivers manifest distinctly in port and maritime logistics contexts, where infrastructure constraints, regulatory complexity, and multi-stakeholder coordination requirements amplify vulnerability beyond typical supply chain configurations.

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3.1.3 FINANCIAL IMPACT OF SUPPLY CHAIN DISRUPTION

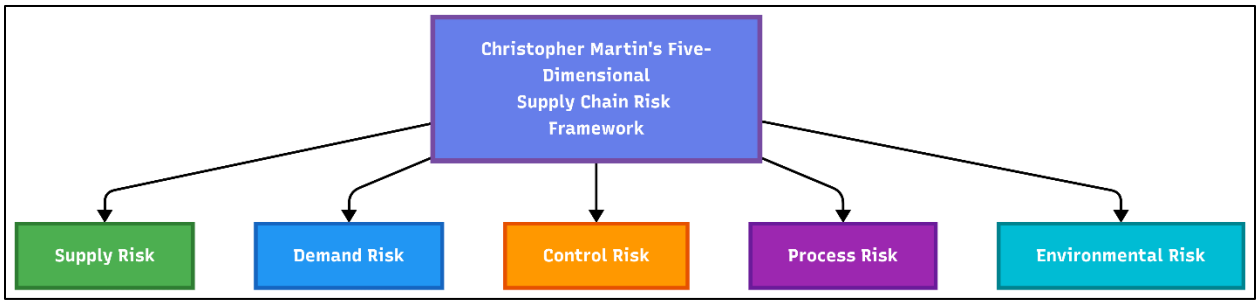
Supply chain disruptions impose substantial financial costs at both macro and micro levels. Global estimates indicate businesses incur approximately US$184 billion annually from supply chain disruptions (2024 data), with individual companies experiencing financial losses averaging 8% of annual revenues (Industry survey data, 2024). These impacts extend beyond immediate operational losses to encompass customer relationship damage, reputational costs, and potential regulatory penalties, cumulatively threatening organizational viability.

3.1.4 SUPPLY CHAIN RESILIENCE FRAMEWORK

Supply chain resilience, defined as "the ability of a supply chain to return to its original state or move to a new, more desirable state after being disturbed", encompasses two distinct capabilities: robustness (ability to withstand disruptions) and recovery capability (speed of recovery following disruptions). Resilience represents a dynamic capability that requires continuous organizational learning, adaptation, and investment in redundancy and flexibility.

3.2 CHRISTOPHER MARTIN'S FIVE-DIMENSIONAL RISK CLASSIFICATION FRAMEWORK

This study adopts Christopher Martin's comprehensive risk classification framework, which categorizes supply chain risks into five primary dimensions. This framework provides a structured approach to identifying, analyzing, and mitigating diverse risk sources affecting maritime supply chains.



3.2.1 SUPPLY RISKS

Definition: Supply risks are disruptions that affect the inbound flow of goods, materials, and services. These risks originate from suppliers, infrastructure providers, and external factors impacting resource availability.

Characteristics:

- Impact upstream supply chain operations
- Often result from capacity constraints or infrastructure limitations
- Can create immediate operational disruptions.
- Require long-term strategic investment to mitigate.
- Application to Maritime Context:

Application to Bangladesh Maritime Context:

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In Bangladesh's maritime supply chain, supply risks manifest primarily through port congestion, draft depth limitations, inadequate equipment, and vessel capacity constraints that restrict the flow of containerized cargo.

3.2.2 DEMAND RISKS

Definition: Demand risks are uncertainties affecting the outbound flow of goods to customers and markets. These risks originate from market volatility, policy changes, and competitive dynamics.
Characteristics:

- Impact downstream supply chain operations
- Result from external market forces
- Create revenue and volume uncertainties.
- Require market diversification and strategic positioning.

Application to Bangladesh Maritime Context:

For Bangladesh, demand risks include global market volatility, geopolitical tensions, and intensifying regional competition in manufacturing exports.

3.2.3 PROCESS RISKS

Definition: Process risks are operational failures within supply chain operations that disrupt smooth cargo flow. These arise from inefficient procedures, inadequate technology, and operational errors.
Characteristics:

- Results from internal operational inefficiencies
- It can be addressed through process improvement and technology adoption.
- Create transaction costs and delays.
- Impact customer satisfaction and competitiveness

Application to Maritime Context:

Process risks in Bangladesh's maritime sector include inefficient customs procedures, fragmented governance, workforce skill gaps, and inadequate technology infrastructure.

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3.2.4 CONTROL RISKS

Definition:
Control risks are failures in governance, compliance, and management frameworks that prevent effective risk monitoring and mitigation.
Characteristics:

- Stem from weak institutional frameworks
- Create unpredictable operating environments.
- Undermine transparency and accountability.
- Require governance reforms and institutional strengthening.

Application to Maritime Context:

Control risks include regulatory uncertainty, inadequate risk management frameworks, corruption, weak enforcement of standards, and political instability affecting Bangladesh's maritime operations.

3.2.5 ENVIRONMENTAL RISKS

Definition:
Environmental risks are external disruptions from natural disasters, climate change, and environmental degradation affecting supply chain operations.
Characteristics:

- Originate from natural and climatic factors.
- Create long-term existential threats.
- Require adaptation and resilience investments.
- Increasingly critical in climate-vulnerable regions

Application to Maritime Context:
Environmental risks for Bangladesh include sea-level rise, coastal erosion, climate-induced disruptions, ecosystem damage, and increasing environmental compliance pressures.

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CHAPTER 4: METHODOLOGY AND DATA COLLECTION PROCESS

4.1 DESIGN AND EPISTEMOLOGICAL FRAMEWORK

The approach adopted for collecting and analyzing data related to maritime operations at Chattogram Port. The framework combines quantitative insights from structured surveys with qualitative perspectives from industry professionals, ensuring a comprehensive understanding of operational challenges and improvement opportunities. The approach emphasizes practical problem-solving and actionable outcomes, aligning with global best practices in supply chain management.

4.1.1 MIXED-METHODS APPROACH

A mixed-method approach was adopted, integrating quantitative survey data with qualitative insights. This combination allows triangulation of findings, enhancing validity and reliability. Multiple data sources provide complementary perspectives, ensuring that conclusions reflect real-world conditions at Chattogram Port.

4.1.2 CASE STUDY STRATEGY

The case study focuses on container operations at Chattogram Port, enabling in-depth analysis of operational risks within a specific context. This approach captures local institutional arrangements, regulatory frameworks, and organizational practices influencing maritime logistics.

4.2 QUANTITATIVE DATA COLLECTION: SURVEY DESIGN AND SAMPLING

4.2.1 SURVEY POPULATION AND SAMPLING STRATEGY

The survey targeted professionals from shipping companies and terminal operators at Chattogram Port. All responses were collected online. A total of 10 respondents participated, representing global and regional operators. This ensured insights from stakeholders directly involved in vessel operations and cargo handling.

4.2.2 SURVEY INSTRUMENT DESIGN AND CONTENT

The questionnaire included structured questions grouped into thematic areas:

- **Operational Risk Assessment:** Severity and frequency of risks such as port congestion, customs delays, and cargo damage.
- **Governance and Infrastructure Challenges:** Perceptions of governance effectiveness and infrastructure gaps.
- **Technology and Digital Integration:** Evaluation of PCS and readiness for digital transformation.
- **Strategic Improvements:** Recommendations for infrastructure upgrades and global best practices.

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4.3 SECONDARY DATA COLLECTION AND ANALYSIS

The approach for gathering and analyzing secondary data related to maritime operations at Chattogram Port. The focus is on documentary sources, statistical databases, and visualization techniques to present insights in a clear and structured manner.

4.3.1 DOCUMENTARY SOURCES

Secondary data was collected from multiple sources, including:

- Chattogram Port Authority annual reports.
- Operational statistics and performance data
- Government publications (Ministry of Shipping reports, maritime policy documents)
- Industry reports (port technology analyses, shipping industry studies)
- Academic literature (journal articles, conference papers on maritime supply chain management)

4.3.2 DATA VISUALIZATION TECHNIQUES

To present complex supply chain risk information effectively, the following visualization techniques are recommended:

- Affinity Diagram: Organizes risks into logical groupings based on category, frequency, severity, and mitigation strategies.
- Risk Classification Tree: Displays hierarchical relationships among risk categories and specific risk types.
- Comparative Performance Tables: Compares Chattogram Port performance with regional competitors on throughput, draft depth, turnaround time, and digital integration.

4.4 LIMITATIONS OF METHODOLOGY

- **Sample Size Limitation:** With 10 survey respondents, statistical generalization is limited. Findings should be interpreted as indicative rather than definitive.
- **Temporal Limitation:** Data collection at a single time point cannot capture seasonal variations or long-term trends.
- **Stakeholder Limitation:** Focus on shipping lines and 3PLs exclude perspectives from government agencies, port workers, and end customers.
- **Self-Reporting Bias:** Survey responses reflect respondent perceptions, which may differ from objective measurements.
- **Geographic Limitation:** Focus on Chattogram Port may not represent conditions at other Bangladeshi ports.

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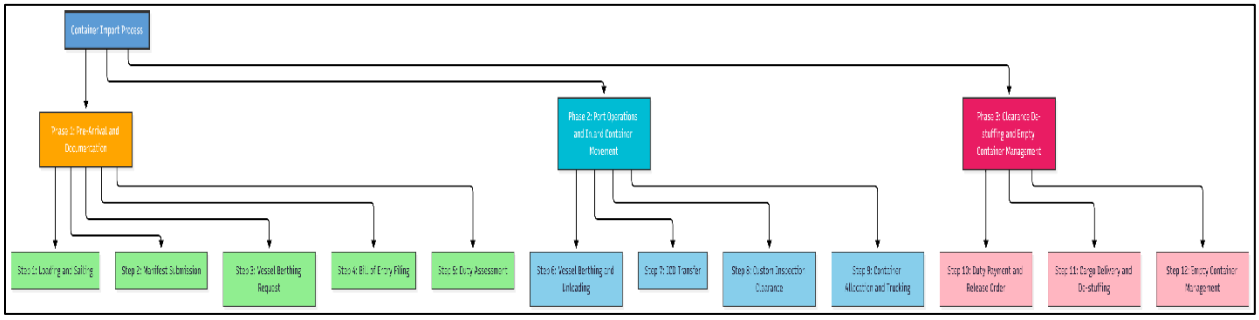
CHAPTER 5: FINDINGS AND RISK ANALYSIS

5.1 THE CONTAINER JOURNEY: IDENTIFYING OPERATIONAL CHALLENGES

To understand the practical challenges facing Bangladesh's maritime supply chain, it is instructive to examine the typical journey of a container through Chattogram Port. The container journey reveals several critical operational inefficiencies that are significant risks to supply chain performance and competitiveness.

5.1.1 FOR IMPORT PROCESS:

Here is the diagram with a step-by-step process for the import journey.


Container Import Process
Phase 1: Pre-Arrival and Documentation
Phase 2: Port Operations and Inland Container Movement
Phase 3: Clearance De-stuffing and Empty Container Management
Step 1: Loading and Sailing
Step 2: Manifest Submission
Step 3: Vessel Berthing Request
Step 4: Bill of Entry Filing
Step 5: Duty Assessment
Step 6: Vessel Berthing and Unloading
Step 7: ICD Transfer
Step 8: Custom Inspection Clearance
Step 9: Container Allocation and Tracking
Step 10: Duty Payment and Release Order
Step 11: Cargo Delivery and De-stuffing
Step 12: Empty Container Management

Phase 1: Pre-Arrival and Documentation

This phase covers the activities from the moment the container is loaded onto the vessel until the vessel is ready to berth at Chittagong Port.

Step	Activity	Responsible Party	Description
1. Loading and Sailing	Container is loaded onto the feeder vessel at a transshipment hub (e.g., Singapore, Colombo, Port Klang).	Carrier/Vessel agent	The container is loaded into feeder vessel, and the vessel begins its voyage to Chittagong Port.
2. Manifest Submission	Submission of the Import General Manifest (IGM).	Shipping Agent	The local shipping agent submits the IGM to Bangladesh Customs (National Board of Revenue - NBR) and the Chittagong Port Authority (CPA) **at least 48 hours before the vessel departs from the last foreign port**. This document details all containers' information on board.

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3. Vessel Berthing Request	Vessel submits a request for berth to the CPA.	Shipping Agent	Due to draft restrictions and congestion, the vessel may face significant waiting times (typically 1-6 days, occasionally up to 10 days during peak congestion) before a berth is allocated on a first-come, first-served basis.
4. Bill of Entry (B/E) Filing	Preparation and electronic submission of the Bill of Entry.	Importer/Customs Clearing & Forwarding (C&F) Agent	The C&F agent prepares the B/E, which is the formal declaration of the imported goods, along with supporting documents (Commercial Invoice, Packing List, Bill of Lading, Certificate of Origin, etc.) to Customs.
5. Duty Assessment	Customs assesses the declared value and calculates the import duties and taxes.	Bangladesh Customs	The B/E is processed through the Automated System for Customs Data (ASYCUDA World) to determine the payable amount.

Phase 2: Port Operations and Inland Container Movement

This phase details the physical handling of the container within the port premises and its subsequent movement via cargo truck to its clearance destination.

Step	Activity	Responsible Party	Description
6. Vessel Berthing and Unloading	The vessel berths, and containers are discharged.	CPA/Terminal Operator	Containers are unloaded and moved to the designated yard location (stacking area).
7. ICD Transfer (Mandatory)	Transfer of ICD-bound containers **via cargo truck**.	CPA/Terminal Operator/ICD Operator	NBR mandates that all ICD-bound import containers must be transferred to the off-docks on the same day of discharge (or by the following day if immediate transfer is not possible) to reduce port congestion. This transfer is predominantly done by cargo truck.

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8. Custom Inspection Clearance	Customs selects containers for physical inspection.	Bangladesh Customs/C&F Agent	Inspection takes place either at the port yard or the designated ICD/Off dock to verify the declared contents against the B/E.
9. Container Allocation and Trucking	Containers are segregated and moved by cargo truck.	CPA/Terminal Operator/Trucking Agent	The laden containers are offloaded and immediately moved by cargo truck to either the main port yard for clearance or to one of the 19 private Inland Container Depots (ICDs)/Off docks for de-stuffing.

Phase 3: Clearance, De-stuffing, and Empty Container Management

This final phase involves the completion of customs formalities, the physical handover of the cargo, and the crucial management of the empty container.

Step	Activity	Responsible Party	Description
10. Duty Payment and Release Order	Payment of assessed duties and issuance of the final release order.	Importer/C&F Agent/Bangladesh Customs	Upon successful payment (via online A-Challan system or at bank branches) and clearance, Customs issues a 'Gate Pass' or final release order, officially clearing the cargo for exit.
11. Cargo Delivery and De-stuffing	The container is opened, and goods de-stuffing	ICD/CFS Operator or Importer	**Option A:** Destuffing at port - Some containers were destuffed at Chittagong port and from them they delivered the product partial wise. **Option B:** ICD/CFS bound container - De-stuffing (unloading) occurs at the off-dock, and the loose cargo is delivered to the importer. **Option C:** Delivered to direct consignee - The container is delivered directly to the importer's transport after the Gate Pass is presented at the port gate.

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12. Empty Container Management (Crucial Step)	Empty containers are managed for re-use in the export cycle.	Shipping Line/ICD Operator/Transport Agent	**Option A (Port Re-use):** Some empty containers (which are destuffed at Chittagong port) remain at the port yard to be immediately re-stuffed with export cargo for the next outgoing vessel. **Option B (Depot Storage/Export Collection):** The majority of empty containers are transported by trailer van to various ICDs or designated empty container depots across the country to be stored and then supplied to exporters for stuffing with export goods.

5.1.2 FOR EXPORT PROCESS

Here is the step-by-step process for the export journey:

Step 1: Goods Prepared at End Customer's Factory/Location: Goods are manufactured, packed, and prepared for export at the customer's facility (e.g., factory or warehouse).

Step 2: Container Loading (Two Pathways)

Pathway A - EPZ/Bonded Area (Direct Loading):

Step 2A: An empty container is delivered to the customer's location (EPZ or bonded area)

Step 2B: Container loaded with export goods at factory premises.

Step 2C: Custom clearance and documentation completed at the factory site.

Step 2D: Loaded container transported directly to Chittagong Port

Step 2E: Random inspection by Customs and Port Authority at port gate (if required)

Step 2F: Container delivered to port yard awaiting export vessel.

Pathway B - Non-EPZ Area (ICD/Depot Loading):

Step 2A: Goods/cargo transported from factory or warehouse to private ICD/depot via truck.

Step 2B: Goods stuffed into containers at the ICD under customs supervision.

Step 2C: Custom clearance and documentation completed (assessment done at Chittagong Custom House)

Step 2D: Loaded container stored at ICD until vessel loading schedule.

Step 2E: Final customs checking before container exits ICD.

Step 2F: Container transported to Chittagong Port and delivered to port yard.

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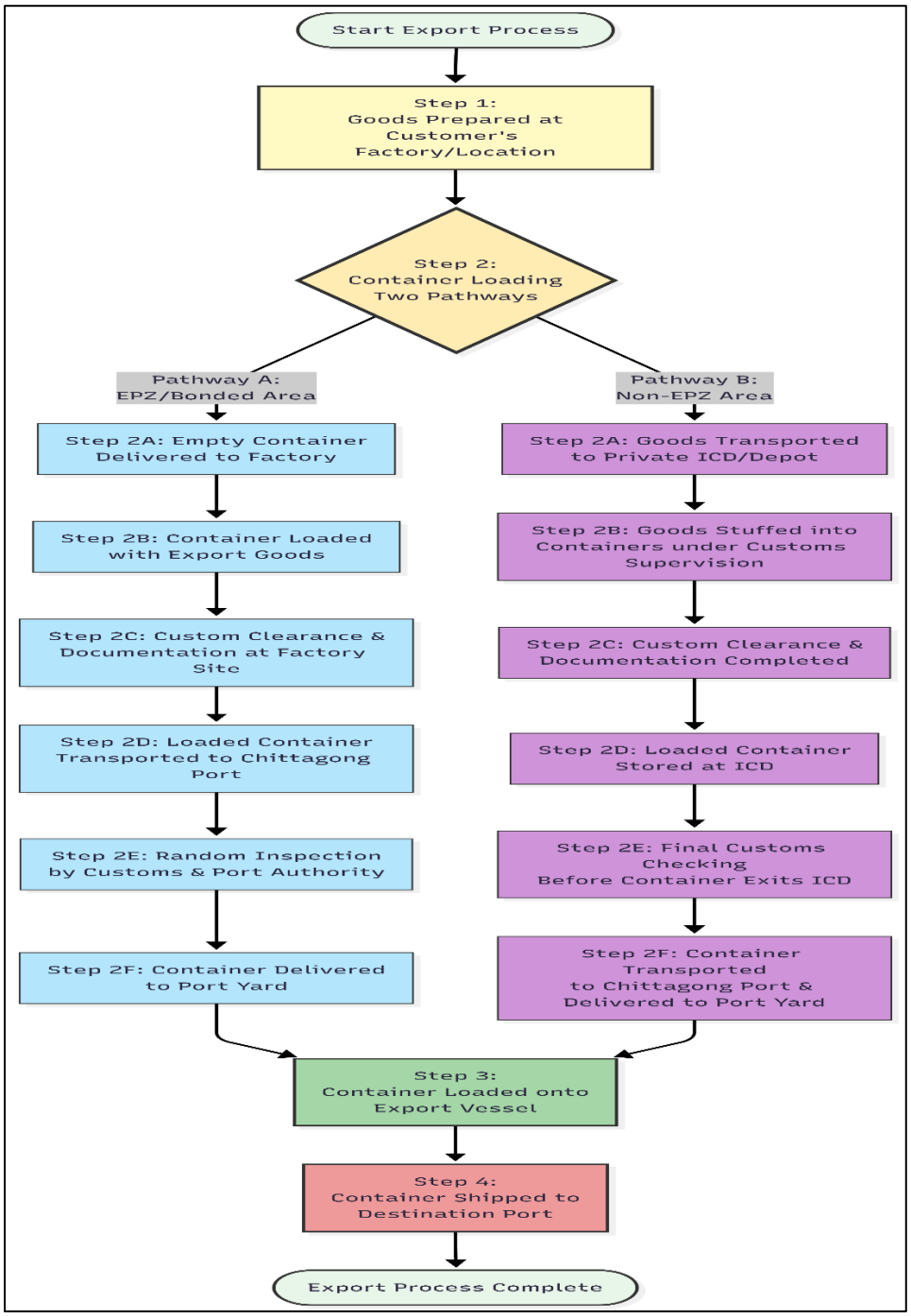
Step 3: Container Loaded onto Vessel

The cleared container is loaded onto the export vessel at Chittagong Port.

Step 4: Container Shipped to Destination Port

The vessel departs, carrying the container to the international destination port.

The process flow chart is like:


Start Export Process
Step 1: Goods Prepared at Customer's Factory/Location
Step 2: Container Loading Two Pathways
Pathway A: EPZ/Bonded Area
Pathway B: Non-EPZ Area
Step 2A: Empty Container Delivered to Factory
Step 2B: Container Loaded with Export Goods
Step 2C: Custom Clearance & Documentation at Factory Site
Step 2D: Loaded Container Transported to Chittagong Port
Step 2E: Random Inspection by Customs & Port Authority
Step 2F: Container Delivered to Port Yard
Step 2A: Goods Transported to Private ICD/Depot
Step 2B: Goods Stuffed into Containers under Customs Supervision
Step 2C: Custom Clearance & Documentation Completed
Step 2D: Loaded Container Stored at ICD
Step 2E: Final Customs Checking Before Container Exits ICD
Step 2F: Container Transported to Chittagong Port & Delivered to Port Yard
Step 3: Container Loaded onto Export Vessel
Step 4: Container Shipped to Destination Port
Export Process Complete

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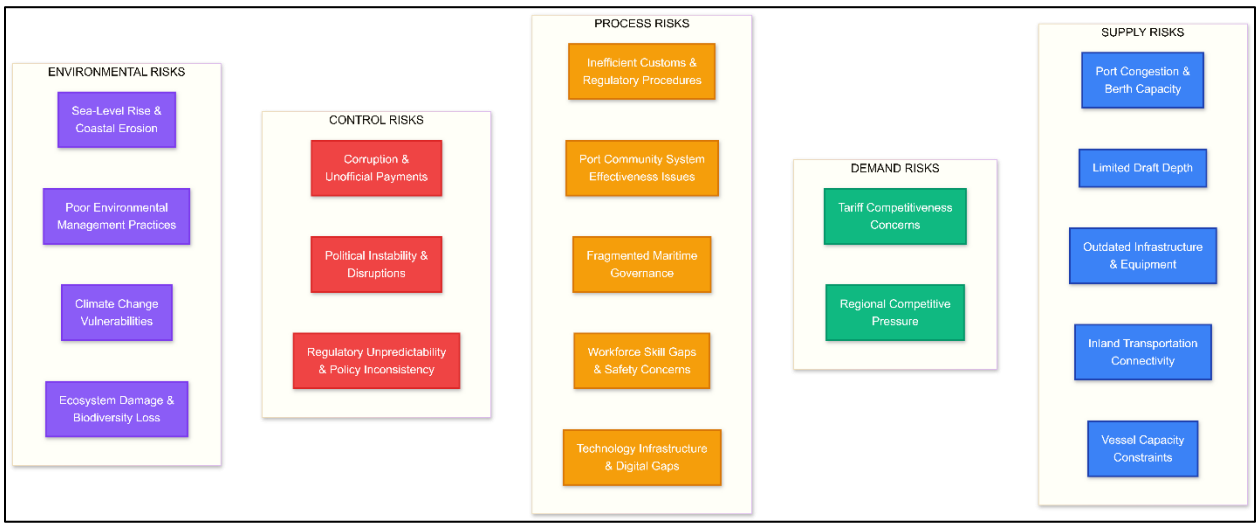
5.2 COMPREHENSIVE RISK ASSESSMENT: FROM OPERATIONAL REALITY TO STRATEGIC FRAMEWORK

The container journey analysis in Section 5.1 revealed multiple operational friction points—from vessel berthing delays and customs bottlenecks to empty container repositioning challenges and fragmented inter-agency coordination. However, addressing these challenges piecemeal without understanding their systemic nature and interdependencies would prove ineffective. Individual operational problems are symptoms of deeper structural vulnerabilities that require strategic-level intervention.

To move from operational observation to strategic diagnosis, this comprehensive risk assessment adopts Christopher Martin's Five-Dimensional Risk Classification Framework, which systematically categorizes supply chain vulnerabilities into five distinct risk types.

Here is the Comprehensive Risk Assessment Table



5.2.1 SUPPLY RISKS: INFRASTRUCTURE AND CAPACITY CONSTRAINTS

Supply risks are those disruptions that affect the inbound flow of goods, materials, and services into the maritime supply chain, originating from infrastructure limitations, port capacity constraints, and equipment inadequacy.

5.2.1.1 Port Congestion and Berth Capacity Constraints

Operational data confirms:

- Vessel berth waiting time: Significantly reduced, with zero waiting days recorded for 26 days each in November and December 2025.
- Average vessel turnaround time: 2.53 days (January to November 2025).
- Demurrage costs: $500-1,000 per vessel per day
- Current berth capacity: 24 berths serving 4,273 vessels annually (2025 data).

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5.2.1.2 Limited Draft Depth Restrictions

Draft depth appeared as the most frequently cited infrastructure limitation in survey responses. Multiple respondents explicitly identified this as a primary operational risk.

Strategic Context:

Vessel capacity constraints reflect Bangladesh's secondary position in regional shipping networks. Until draft depth is addressed, shipping lines prioritize direct calls to deep-water ports like Colombo and Singapore, resulting in limited vessel availability on Bangladesh routes due to competitive pressure from other regional ports and draft limitations.

Operational Impact:

- Difficulty securing vessel space during peak seasons (October-March)
- Limited direct calls from major shipping lines
- Dependence on feeder operators with less frequent service
- Higher freight rates during peak seasons (20-30% premium)
- Reduced schedule reliability.

Economic Impact:

- Forces mandatory feeder transshipment through Colombo, Singapore, Port Klang
- 15-20% higher per-unit transportation costs due to mandatory feeder service dependency
- 3-5 additional days transit time for transshipment operations
- Reduced shipping line service frequency and connectivity options.
- Competitive disadvantage in attracting direct vessel calls.

5.2.1.3 Outdated Port Infrastructure and Equipment

Operational Impact: Berth productivity currently 15-20 moves/hour vs. regional 30-40 moves/hour.

Current State at Chattogram Port:

- Last major crane purchase: 20 years ago
- Berth productivity: 15-20 moves per hour.
- Manual and semi-automated operations predominate.
- Limited real-time cargo tracking capability
- Aging equipment with frequent breakdowns

Regional Competitor Standard:

- Equipment age: 5-10 years average
- Berth productivity: 30-40 moves per hour.
- Fully automated or semi-automated operations
- Integrated real-time tracking and TOS systems.
- Modern Ship-to-Shore (STS) cranes and Rubber-Tyred Gantry (RTG) cranes
- Productivity Gap: 50-60% below regional standards.

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5.2.1.4 Inland Transportation Connectivity Constraints

Operational Challenges:

Infrastructure Gap:

- Inadequate road infrastructure for container truck traffic
- Limited rail connectivity and utilization
- Inefficient inland waterway integration
- Traffic congestion on port access roads
- Drivers' skill and safety concerns

5.2.1.5 Vessel Capacity Constraints

Limited vessel availability on Bangladesh routes due to competitive pressure from other regional ports and draft limitations.

Strategic Context:

Vessel capacity constraints reflect Bangladesh's secondary position in regional shipping networks. Until draft depth is addressed, shipping lines prioritize direct calls to deep-water ports like Colombo and Singapore.

Operational Impact:

- Difficulty securing vessel space during peak seasons (October-March)
- Limited direct calls from major shipping lines
- Dependence on feeder operators with less frequent service
- Higher freight rates during peak seasons (20-30% premium)
- Reduced schedule reliability.

5.2.2 DEMAND RISKS: MARKET COMPETITIVENESS AND TRADE POLICY CHALLENGES

Demand risks are those uncertainties affecting the outbound flow of goods to customers and markets, originating from market volatility, trade policy changes, geopolitical tensions, and competitive positioning erosion.

5.2.2.1 Tariff Competitiveness Concerns

Comparative Context:

The uncompetitive tariff rating appears paradoxical given that Chattogram's published tariffs are not necessarily higher than regional competitors. This suggests that respondents are assessing total cost of operations (including delays, demurrage, unofficial payments, and inefficiencies) rather than nominal tariff schedules alone.

5.2.2.2 Regional Competitive Pressure

Stakeholders emphasize that Bangladesh should benchmark against gateway ports serving national economies (Chennai, Mumbai, Jakarta, Manila, Laem Chabang) rather than global transshipment hubs (Singapore, Colombo, Port Klang). However, even against appropriate comparators, Chattogram lags significantly in operational efficiency and technology adoption.

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5.2.3 PROCESS RISKS: OPERATIONAL INEFFICIENCIES AND PROCEDURAL BOTTLENECKS

Process risks are those operational failures within the maritime supply chain that disrupt smooth cargo flow, arising from inefficient procedures, inadequate technology, lack of standardization, and operational errors.

5.2.3.1 Inefficient Customs and Regulatory Procedures

Process Analysis: The Bill of Entry (B/E) process requires submission of 8-12 separate documents, multiple approval stages, and frequently requires physical clarification meetings with customs officials. ASYCUDA World system, while electronic, is not fully integrated with port systems, requiring duplicate data entry.

5.2.3.2 Port Community System Effectiveness Assessment:

Operational Impact:

Customs Clearance Time:

- Chattogram Port: 10-12 days average
- Regional competitors: 1-3 days
- Gap: 7-11 days additional delay

Cost Impact:

- Demurrage accumulation: $500-1,000 per day for 7-10 excess days
- Additional cost per container: $3,500-10,000
- Represents approximately 5-10% of transaction value.

5.2.3.3 Fragmented Maritime Governance and Coordination Gaps

Although not directly measured in survey questions, governance fragmentation emerged as a recurring theme in qualitative responses.

Governance Structure Challenge:

Container clearance at Chattogram Port requires coordination across minimum 5 separate government agencies:

A. National Board of Revenue (NBR) - Customs
B. Chattogram Port Authority (CPA)
C. Ministry of Shipping
D. Department of Environment
E. Product-specific regulators (BSTI for standards, Drug Administration, etc.)

Each operates separate systems with minimal integration.

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Operational Consequences:

- Duplication of documentation requirements
- Sequential rather than parallel processing
- Inconsistent procedural requirements across agencies
- No single-window clearance system
- Conflicting instructions and requirements
- Limited inter-agency accountability

International Best Practice Gap:

- Leading maritime nations operate National Single Window systems enabling:
- Single-point document submission
- Parallel agency processing
- Automated risk-based clearance
- Integrated digital platforms.
- Clear service level agreements

Bangladesh lacks this integrated approach.

5.2.3.4 Workforce Skill Gaps and Safety Concerns

Skill Gap Dimensions:

- Technical Competency Gaps:
    - Modern Terminal Operating System (TOS) proficiency limited.
    - Advanced equipment operation skills inadequate
    - International documentation standards not consistently followed.
    - Digital platform utilization below industry standards
    - Supply chain risk management capabilities limited.
- Safety and Professionalism Concerns:
    - Workplace safety standards below international norms
    - Driver training and professionalism inadequate
    - Health, Safety, Security, and Environment (HSSE) practices weak
    - Traffic management systems insufficient

Training Infrastructure Gap:

Bangladesh lacks specialized maritime logistics degree programs at scale. Most training occurs on-the-job without standardization or international certification alignment. This creates:

- Inconsistent skill levels across workforce
- Limited capacity to absorb modern technologies.
- High operational error rates
- Difficulty meeting international compliance standards.

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5.2.3.5 Technology Infrastructure and Digital Transformation Gaps

Current Technology State:

Existing Systems:

- Port Community System (PCS) exists but with limited adoption and integration.
- ASYCUDA World is used for customs but not fully integrated with port operations.
- Paper-based processes persist alongside digital systems.
- Limited Electronic Data Interchange (EDI) connectivity
- Real-time tracking capabilities inadequate
- Manual gate operations create bottlenecks.

Technology Gap Summary:

- Gate automation: Manual processes vs. OCR and RFID standards
- Equipment integration: Limited connectivity vs. fully integrated systems
- Data systems: Fragmented vs. unified platforms.
- Real-time visibility: Limited vs. comprehensive tracking

5.2.4 CONTROL RISKS: GOVERNANCE, REGULATORY, AND INSTITUTIONAL CHALLENGES

Control risks are failures in governance, compliance, and management frameworks that prevent effective monitoring and mitigation of other risks, arising from weak institutional capacity, regulatory uncertainty, and integrity deficits.

5.2.4.1 Corruption and Unofficial Payments - The Critical Control Risk

Survey Findings - Frequency Assessment:

Primary survey data reveal a high perceived incidence of requests for unofficial payments or facilitation fees at Bangladesh ports. On a 1–5 frequency scale, responses showed:

- Very Frequent (5/5): 54.5% (6 respondents)
- Frequent (4/5): 18.2% (2 respondents)
- Moderate (3/5): 27.3% (2 respondents)

With 72.7% of participants reporting high frequency (4/5 or 5/5), the results confirm that unofficial payments are not anomalous but constitute an entrenched operational reality. This aligns with broader governance challenges in the logistics sector, including persistent perceptions of corruption documented in national and international assessments (e.g., Transparency International's Corruption Perceptions Index, where Bangladesh scored 23/100 in 2024, ranking 151/180 globally).

Financial Impact:

- Survey respondents and industry sources estimate:
    - Unofficial payments add 5-10% to transaction costs.
    - Unpredictability creates supply chain risk beyond direct financial cost.
    - Ethical concerns for international companies with compliance requirements
    - Investor confidence is undermined by corruption perception.

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5.2.4.2 Political Instability operation Disruptions

Political instability and associated labor/political unrest in Bangladesh, particularly during 2025, periodically triggered significant operational disruptions at Chattogram Port. Key incidents included protests over port reforms, tariff hikes, foreign operator leasing, and NBR/customs-related shutdowns, leading to road blockades, severe yard congestion, vessel rerouting, temporary halts, and sharp cost escalations. The following effects were prominently observed in 2025:

- Port access roads were blocked for several days.
- Container accumulation exceeded 40,000 TEUs.
- Vessel diversions to alternative ports (Colombo, Port Klang)
- Operational shutdowns lasting 1-7 days.
- Logistics costs surged 20-50% during disruption period.

Business Continuity Impact:

- Extreme unpredictability complicating long-term planning.
- Buyer confidence weakens as international customers question reliability.
- Insurance premium increases due to country risk perception.
- Investment hesitancy among potential private sector participants
- Reputational damage to Bangladesh as a stable trading partner

Mitigation Challenges:

Unlike infrastructure or process risks that can be mitigated through investment and reform, political stability depends on factors largely outside port operators' control, making this one of the most challenging risks to manage.

5.2.4.3 Regulatory Unpredictability and Policy Inconsistency

Recent Examples:

- Periodic changes to demurrage/detention fee structures
- Ad-hoc import restrictions on specific product categories.
- Modifications to customs valuation procedures

Impact on Operations:

- Difficulty in long-term investment planning
- Increased compliance costs to adapt to changing requirements.
- Unpredictable operating environment
- Hesitancy among private investors
- Need to maintain flexible buffer capacity.

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5.2.5 ENVIRONMENTAL RISKS: CLIMATE VULNERABILITY AND SUSTAINABILITY CHALLENGES

Environmental risks are external disruptions from natural disasters, climate change, environmental degradation, and sustainability compliance requirements that affect maritime operations and long-term infrastructure viability.

5.2.5.1 Sea-Level Rise and Coastal Erosion

Climate change-induced sea-level rise threatens coastal infrastructure, including port facilities.

Climate Science Evidence:

IPCC projections indicate Bay of Bengal region faces 0.5-1.0-meter sea-level rise by 2050 under moderate scenarios, with potential for 1.5-2.0 meters by 2100 under high-emission scenarios. Chattogram Port's current elevation provides limited buffer against these projections.

Operational Impact:

- Long-term existential threat to port viability
- Infrastructure damage from coastal erosion
- Increased flooding during monsoon season
- Saltwater intrusion affecting coastal areas.
- Potential relocation costs: estimated $1-2 billion.
- Chattogram Port facilities at risk from 1–2-meter sea-level rise by 2100

5.3.5.2 Poor Environmental Management Practices

- **Current Challenges:**
    - Vessel emissions: Estimated 1,000+ tons CO2 daily from vessels at port.
    - Port equipment emissions contributing to urban air pollution.
    - Inadequate waste management systems
    - Limited pollution monitoring and enforcement
    - No systematic environmental impact assessments
    - Water quality degradation in Karnaphuli River
    - Impact on fishing communities and marine ecosystems
- **Compliance Pressure:**
    - International Maritime Organization (IMO) Requirements:
    - IMO 2030 target: 40% carbon intensity reduction from 2008 baseline.
    - IMO 2050 target: Net-zero emissions.
    - MARPOL pollution prevention standards
- **European Union Standards:**
    - Carbon Border Adjustment Mechanism (CBAM) affecting exports.
    - Environmental compliance is increasingly required by international buyers.
    - Shore power mandates at major European ports

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- **Market Access Risk:**
    - Environmental non-compliance threats:
    - Loss of environmentally conscious shipping line business
    - Buyer requirements for sustainable supply chains
    - Potential export restrictions or penalties
    - Reputational damage in international markets

5.2.5.3 Climate Change Vulnerabilities and Adaptation Gaps

Long-Term Existential Threat:

Although not directly assessed in the survey, climate change poses the most severe long-term environmental risk to Chattogram Port's viability.

Climate Projections for Bay of Bengal Region:

IPCC Scenarios:

- By 2050: 0.5-1.0-meter sea-level rise under moderate scenarios
- By 2100: 1.5-2.0 meters under high-emission scenarios
- Cyclone intensity: Increasing even if frequency remains stable.
- Coastal erosion: Accelerating along Bangladesh coastline.

Infrastructure Vulnerability:

Chattogram Port's current elevation and coastal protection infrastructure provide limited buffer against projected sea-level rise and storm surge impacts.

Operational Disruptions:

Current Climate Impacts:

- Cyclone season disruptions (May-October): Port closures 1-5 days per major event
- Monsoon flooding affects port access roads.
- Storm surge risks during high-intensity cyclones
- Increased frequency of extreme weather events

5.2.5.4 Ecosystem Damage and Biodiversity Loss

Port expansion and maritime operations damage marine ecosystems and biodiversity. Port expansion has displaced fishing communities and reduced access to traditional fishing grounds. Compensation mechanisms have been inadequate, creating social tensions.

Operational Impact:

- Environmental degradation of Bay of Bengal
- Regulatory restrictions on port expansion
- Loss of fishing grounds affecting coastal livelihoods
- Community conflicts with port development
- Loss of ecosystem services (coastal protection, fisheries)
- Mangrove destruction for port infrastructure
- Loss of marine biodiversity
- Coral reef damage from dredging and pollution

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5.3 STRATEGIC RECOMMENDATIONS FOR IMPROVING EFFICIENCY OF CONTAINER OPERATIONS

The analysis reveals a maritime supply chain for Chattogram Port marked by critical vulnerabilities across all five risk dimensions assessed. Nevertheless, these challenges are addressable through targeted interventions. Survey respondents identified clear priorities for action, corroborated by operational data and international benchmarking.

Accordingly, this report proposes a comprehensive, evidence-based strategy to elevate Bangladesh's maritime sector from its current state of vulnerability and inefficiency to a resilient, competitive regional gateway. The recommendations are firmly rooted in primary survey findings, stakeholder insights, and established global best practices. They are structured along the same five-dimensional risk framework employed in the analysis.

STRATEGIC RECOMMENDATION 1: ACCELERATE DRAFT DEEPENING PROGRAM AND ADDRESS VESSEL CAPACITY CONSTRAINTS

Addressing Supply Risk: Limited draft depth restrictions and vessel capacity constraints.

Action Steps:

Immediate Priority (Short-term): Achieve 12-meter Draft.

- Expedite ongoing dredging contracts to reach 12m minimum depth.
- Establish continuous maintenance dredging program (not one-time project)
- Widen navigation channel to accommodate larger vessels safely.
- Improve aids to navigation and channel marking.
- Negotiate with shipping lines for increased feeder service frequency.
- Establish vessel slot reservation systems during peak seasons.
- Improve berth allocation efficiency to accommodate more vessel calls.

Medium-Term Target: Achieve 14-meter Draft.

- Comprehensive channel deepening to 14m to match Indian gateway ports.
- Turning basin expansion for larger vessel maneuvering
- Berth aprons deepening at key terminals.
- Long-term dredging maintenance contracts (10-15 years)
- Market Chattogram Port to major shipping lines as viable direct call destination
- Negotiate direct service agreements with global carriers.
- Provide incentive structures for shipping lines, establishing direct calls.
- Demonstrate improved operational efficiency to attract vessel deployments.

Strategic Evaluation: Deep-Water Port Feasibility

- Complete comprehensive feasibility study for dedicated deep-water port (Matarbari or alternative site)
- Evaluate public-private partnership models.
- Assess demand projections and financial viability.
- Determine if Chattogram upgrade plus deep-water port optimal strategy.

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Expected Impact:

12m Draft Achievement:

- Accommodate vessels up to 8,000-10,000 TEU.
- Reduce per-unit costs by 10-15%
- Increase direct shipping line calls.
- Eliminate most costly transshipment routes.
- Increase vessel service frequency by 25-30%

14m Draft Achievement:

- Accommodate vessels up to 14,000+ TEU (matching JNPT, Chennai)
- Reduce per-unit costs by 15-20% vs. current.
- Improve regional competitive positioning substantially.
- Reduce freight rate premiums during peak seasons from 20-30% to 5-10%
- Improve schedule reliability through reduced hub dependency.
- Enhance Bangladesh's position in regional shipping networks.

STRATEGIC RECOMMENDATION 2: ACCELERATE PRIVATE TERMINAL DEVELOPMENT INFRASTRUCTURE MODERNIZATION AND CAPACITY EXPANSION

Addressing Supply Risk: Outdated port infrastructure and equipment.

Action Steps:

Facilitate Committed Private Terminals:

- Fast-track APM Terminals' Laldia Container Terminal (800,000-1,000,000 TEU capacity)
- Support Red Sea Gateway Terminal's Patenga expansion.
- Ensure DP World's New Mooring Container Terminal achieves full operational capacity.
- Streamline regulatory approvals and land acquisition processes.
- Provide infrastructure connectivity support (road/rail access)

Modernize CPA-Operated Terminals:

- Procure modern Ship-to-Shore (STS) cranes (current equipment 20+ years old)
- Deploy Rubber-Tyred Gantry (RTG) cranes for yard operations.
- Implement modern Terminal Operating Systems (TOS)
- Install Optical Character Recognition (OCR) systems at gates.
- Deploy real-time cargo tracking infrastructure.

Expected Impact:

- Increase berth productivity from 15-20 moves/hour to 30-40 moves/hour.
- Reduce cargo damage.
- Alleviate port congestion through increased throughput capacity.
- Reduce vessel turnaround time from 4-6 days to 2-3 days.
- Achieve 5-6 million TEU capacity by 2030 (vs. current 3.5M)
- Improve capacity utilization from current 85-90% to optimal 70-75%

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STRATEGIC RECOMMENDATION 3: IMPROVE INLAND TRANSPORTATION CONNECTIVITY

Addressing Supply Risk: Inland transportation connectivity constraints.

Action Steps:

Road Infrastructure Enhancement:

- Upgrade port access roads to dedicated container truck corridors.
- Implement traffic management systems to reduce congestion.
- Establish truck staging areas outside port gates.
- Deploying intelligent transportation systems (ITS)

Rail Connectivity Expansion:

- Expand dedicated rail lines to major ICDs and industrial zones.
- Increase frequency of container train services.
- Modernizing rail terminal equipment
- Integrate rail scheduling with port operations.

Inland Waterway Integration:

- Develop container barge services for river transport.
- Establish inland container terminals along major waterways.
- Integrate waterway transport into multimodal logistics planning.

Expected Impact:

- Reduce inland transportation costs by 15-20%
- Improve transportation availability rating.
- Decrease traffic congestion on port access roads.
- Provide modal choice for cargo movement.

STRATEGIC RECOMMENDATION 4: IMPROVE PORT TARIFF COMPETITIVENESS AND VALUE PROPOSITION

Addressing Demand Risk: Tariff Competitiveness Concerns

Action Steps:

Comprehensive Cost Structure Review:

- Conduct detailed benchmarking of Chattogram Port tariffs against Chennai, Mumbai, Jakarta, Laem Chabang
- Identify components where Chattogram charges premiums without corresponding service quality.
- Rationalize fee structures to reflect actual service delivery.
- Eliminate redundant or unjustified charges.

Total Cost Optimization Focus:

- Recognize that "competitiveness" reflects total transaction costs, not just published tariffs.
- Address delays, demurrage, and unofficial payments that inflate effective costs.
- Improve service quality to justify tariff levels.
- Implement transparent pricing with no hidden charges.

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Performance-Based Pricing:

- Introducing incentive structures for faster turnaround times
- Offer discounts for shipping lines meeting volume commitments.
- Provide preferential rates for off-peak operations to balance capacity utilization.
- Implement loyalty programs for consistent port users.

Expected Impact:

- Enhance export competitiveness via competitive tariffs and reduced logistics costs.
- Reduce total transaction costs by 20-25%
- Attract additional cargo volumes through improved value proposition.

STRATEGIC RECOMMENDATION 5: IMPLEMENTATION OF DIGITAL SINGLE WINDOW AND CUSTOMS INTEGRATION (PORT-CUSTOMS SYSTEM INTEGRATION AND AUTOMATION)

Addressing Process Risk: Inefficient Customs and Regulatory Procedures

Action Steps:

Establish Unified Digital Single Window Platform:

Mandate integration of all trade-related regulatory agencies:

- National Board of Revenue (NBR) - Customs
- Chattogram Port Authority (CPA)
- Ministry of Shipping
- Department of Environment
- Product-specific regulators (BSTI, Drug Administration, etc.)

Implement Key Digital Features:

- Paperless documentation (emphasized by multiple respondents)
- Single-point submission for all regulatory requirements
- Parallel agency processing (vs. current sequential approach)
- Risk-based automated clearance for low-risk shipments.
- Real-time status tracking throughout clearance process
- Clear service level agreements (SLAs) with time guarantees.

Technological Components:

- Replace or significantly upgrade ASYCUDA World integration.
- Implement proper Electronic Data Interchange (EDI) standards.
- Integrate I-Banking for duty payments and fee collection.
- Deploy mobile applications for stakeholder access.
- Enable pre-arrival clearance processing.

Port-Customs System Integration:

- Mandate full integration of CPA's Port Community System with NBR's customs platform.
- Enable real-time data sharing between port terminals and customs.
- Implement pre-arrival documentation processing.
- Deploy electronic cargo release systems (no paper gate passes)
- Establish automated risk assessment for physical inspections.

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Expected Impact:

- Reduce customs clearance time from 10-12 days to 3-5 days (60-70% improvement)
- Eliminate duplicate documentation requirements across agencies.
- Decrease demurrage costs by $150-200 million annually (based on 3.7M TEU projection)
- Improve Bangladesh LPI ranking.
- Increase transparency, reducing corruption opportunities.

STRATEGIC RECOMMENDATION 6: DEPLOY GATE AUTOMATION AND REAL-TIME TRACKING INFRASTRUCTURE (DIGITAL TRANSFORMATION AND SYSTEM INTEGRATION)

Addressing Process Risk: Technology Infrastructure and Digital Transformation Gaps
Action Steps:
Gate Automation (Immediate Quick Win):

- Install Optical Character Recognition (OCR) systems at all port gates.
- Implement RFID tags for trucks and containers.
- Deploy automated weighbridges.
- Establish online appointment systems to reduce gate congestion.
- Implement Online Vehicle Booking Marketplace.

Real-Time Tracking Infrastructure:

- GPS tracking for all port equipment and cargo trucks
- IoT sensors for container location within port
- Integrated vessel traffic management system
- Real-time berth planning and optimization algorithms
- Mobile applications for truckers and C&F agents

Modern Traffic and Yard Management:

- Implement advanced Traffic Management (TM) systems.
- Deploying Yard Management Systems (YMS) for optimal container stacking
- Integrate equipment scheduling with vessel operations.
- Real-time vessel scheduling system

Expected Impact:

- Enable pre-arrival clearance for 70% of containers (vs. current 0-10%)
- Reduce physical inspection requirements from 40% to 15-20%
- Eliminate paper documentation gate delays.
- Reduce truck waiting time at gates from 2-4 hours to 15-30 minutes.
- Improve cargo traceability and security.
- Reduce gate congestion and improve traffic flow.

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STRATEGIC RECOMMENDATION 7: ADDRESS FRAGMENTED MARITIME GOVERNANCE

Addressing: Process Risk - Fragmented Maritime Governance and Coordination Gaps

Action Steps:

Establish Unified Maritime Coordination Council:

- Create high-level coordination body with representatives from all maritime-related agencies.
    - Chair: Ministry of Shipping or dedicated Maritime Development Authority
    - Members: NBR, CPA, Ministry of Commerce, Environmental Department, product regulators
    - Mandate: Eliminate procedural duplication, harmonize requirements, establish unified service standards

Implement Coordinated Governance Framework:

- Map all approval processes across agencies.
- Eliminate redundant requirements and documentation.
- Establish parallel processing protocols (vs. sequential)
- Create unified service level agreement.
- Develop inter-agency accountability mechanisms.

Develop National Integrated Logistics and Port Operation Policy:

- Comprehensive policy framework covering all aspects of maritime coordination.
- Clear implementation roadmap with measurable milestones
- Political commitment to genuine implementation.

Expected Impact:

- Reduce number of separate approval points from 5+ agencies to single coordinated process.
- Eliminate procedural duplication and conflicting requirements.
- Decrease total clearance time through parallel processing.
- Improve inter-agency accountability.
- Create predictable, transparent regulatory environment.

STRATEGIC RECOMMENDATION 8: COMPREHENSIVE ANTI-CORRUPTION AND TRANSPARENCY PROGRAM

Addressing: Control Risk - Corruption and Unofficial Payments

Action Steps:

High-Level Political Commitment:

- Ministerial and Prime Ministerial intervention required.
- Establish dedicated Anti-Corruption Unit for Maritime Sector
- Create Anti-Corruption Ministry or dedicated maritime corruption task force.
- Public commitment to zero-tolerance enforcement

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Digital Transparency as Anti-Corruption Tool:

- Implement comprehensive digital audit trails for all transactions.
- Eliminate manual intervention points that enable extraction.
- Deploy automated processing for routine approvals.
- Publish all transactions and processing times in public dashboards.
- Enable anonymous reporting through digital platforms.

Performance-Based KPIs for All Agencies:

- Establish measurable service delivery standards.
- Link agency funding and personnel advancement to performance metrics.
- Publish agency performance publicly.
- Create competitive benchmarking across similar functions.
- Implement consequence mechanisms for persistent underperformance.

Expected Impact:

- Reduce unofficial payment costs from estimated 5-10% to <2% of transaction value.
- Increase investor confidence and FDI inflows.
- Improve international reputation and LPI ranking.
- Enable digital transformation by removing resistance from vested interests.
- Create level playing field for all operators.
- Restore public trust in government institutions.

STRATEGIC RECOMMENDATION 9: ADDRESS POLITICAL INSTABILITY AND BUSINESS CONTINUITY

Action Steps:

Business Continuity Planning:

- Develop comprehensive contingency plans for political disruptions.
- Establish alternative access routes to port facilities.
- Create security protocols to maintain essential operations.
- Designate critical infrastructure requiring continuous protection.
- Maintain international customer confidence through transparent communication.
- Build cross-party consensus on protecting maritime trade continuity.

Expected Impact:

- Minimize operational shutdowns during political events.
- Reduce cargo diversion to alternative ports.
- Maintain international buyer confidence.
- Protect Bangladesh's reputation as stable trading partner.

Note: This remains the most challenging risk as it depends on factors largely outside port operators' control

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STRATEGIC RECOMMENDATION 10: ESTABLISH REGULATORY PREDICTABILITY AND POLICY CONSISTENCY

Addressing Control Risk: Regulatory Unpredictability and Policy Inconsistency

Action Steps:

Regulatory Stability Framework:

- Establish minimum notice periods for regulatory changes (e.g., 90 days)
- Conduct mandatory stakeholder consultations before policy modifications.
- Publish regulatory change calendars with advance notice.

Transparent Policy Development Process:

- Create formal stakeholder input mechanisms for maritime policy.
- Publish draft regulations for public comment.
- Provide clear rationale for regulatory decisions.
- Establish appeals processes for disputed regulatory interpretations.

Long-term Policy Commitment:

- Develop 10-year National Maritime Strategy with cross-party support.
- Insulate key maritime policies from election cycle disruptions.
- Create statutory mandates for critical reforms.
- Establish independent maritime regulatory authority with fixed term leadership.

Implementation Accountability:

- Define clear implementation timelines for announced policies.
- Establish public progress tracking mechanisms.
- Create consequence frameworks for non-implementation.
- Build "pure intention" through demonstrated follow-through.

Expected Impact:

- Reduce investment uncertainty and planning complications.
- Increase private sector confidence for long-term investments.
- Eliminate compliance costs from frequent regulatory adjustments.
- Create predictable operating environment.
- Build credibility through consistent policy implementation.

STRATEGIC RECOMMENDATION 11: IMPROVE ENVIRONMENTAL MANAGEMENT PRACTICES

Addressing Environmental Risk: Poor Environmental Management Practices

Action Steps:

Establish Environmental Monitoring and Compliance Systems:

- Install air quality monitoring stations at port and surrounding areas.
- Implement water quality monitoring in Karnaphuli River and Bay of Bengal
- Deploy emissions measurement systems for vessels and equipment.
- Create regular environmental impact reporting requirements.
- Publish environmental performance data publicly.

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Deploy Shore Power (Cold Ironing) Infrastructure:

- Install shore power at major berths to enable vessels to shut down engines while at berth.
- Reduce emissions by 90%+ during port stay.
- Align with European and advanced Asian port standards.

Strengthen Environmental Enforcement:

- Train dedicated environmental inspectors for maritime sector.
- Establish clear compliance standards aligned with international norms.
- Penalize violations with meaningful consequences.
- Publicize enforcement actions to show commitment.

Vessel Emissions Management:

- Implement vessel emission monitoring and reporting.
- Provide incentives for low emission vessels.
- Establish emission limits for vessels calling at Chattogram.
- Support transition to cleaner marine fuels.

Waste Management Systems:

- Develop comprehensive port waste collection and disposal systems.
- Implement ship-to-shore waste transfer facilities.
- Establish recycling programs for port operations.

Expected Impact:

- Improve environmental management rating from.
- Avoid market access restrictions from environmental non-compliance.
- Reduce local air and water pollution (health benefits for Chattogram)
- Attract environmentally conscious shipping lines and cargo owners.
- Position for future carbon pricing mechanisms
- Meet IMO 2030 target: 40% carbon intensity reduction from 2008 baseline.
- Align with European Union Carbon Border Adjustment Mechanism (CBAM) requirement.

STRATEGIC RECOMMENDATION 12: CLIMATE RESILIENCE AND ADAPTATION INVESTMENT

Addressing Environmental Risk: Climate Change Vulnerabilities and Adaptation Gaps

Climate Science Evidence:

- IPCC projections: 0.5-1.0-meter sea-level rise by 2050 under moderate scenarios
- 1.5-2.0 meters by 2100 under high-emission scenarios
- Bay of Bengal region faces severe climate vulnerability.
- Increasing cyclone intensity even if frequency stays stable.

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Action Steps:

Comprehensive Climate Vulnerability Assessment:

- Conduct detailed engineering assessment of all port infrastructure.
- Model sea-level rise scenarios and storm surge impacts.
- Find critical vulnerabilities requiring immediate attention.
- Develop long-term climate adaptation roadmap.

Design and Implement Protective Measures:

- Seawalls and coastal protection: Engineering designs for critical areas
- Elevated infrastructure: New construction standards accounting for sea-level rise.
- Flood-resistant systems: Electrical, mechanical, and IT systems protection.
- Improved drainage: Enhanced capacity for extreme rainfall events
- Emergency response: Enhanced capabilities for cyclone/flood events

Climate-Adaptive Infrastructure Standards:

- Mandate climate resilience in all new infrastructure designs.
- Incorporate 1–2-meter sea-level rise projections in planning.
- Require storm surge protection for critical facilities.
- Implement building codes accounting for climate scenarios.

Long-term Strategic Evaluation:

- Assess long-term viability of current port location.
- Evaluate potential need for port relocation or new deep-water facility.
- Conduct cost-benefit analysis of adaptation vs. relocation.
- Develop contingency plans for various climate scenarios.

Operational Resilience:

- Minimize operational disruptions from extreme weather.
- Enhance cyclone/flood preparedness and response capabilities.
- Develop business continuity plans for climate events.
- Improve early warning systems and emergency protocols.

Expected Impact:

- Protect infrastructure investments from climate damage (avoid $1-2 billion potential losses)
- Minimize operational disruptions from extreme weather events.
- Demonstrate climate leadership to international community.
- Attract climate-focused investment and development finance.
- Ensure long-term port viability despite climate change.
- Reduce insurance premiums through shown risk mitigation.

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CHAPTER 6: CONCLUSION

6.1 THE PARADOX OF POTENTIAL AND PERFORMANCE

Bangladesh stands at a critical juncture where geographic advantage intersects with operational disadvantage. The fundamental paradox emerges clearly: a nation moving 90 percent of its international trade through seaborne transport tolerates a maritime supply chain that functions 40-50 percent below regional performance benchmarks. This is not marginal underperformance requiring incremental adjustment, this stands for structural dysfunction requiring systemic intervention.

6.2 TOP THREE CRITICAL CONSTRAINTS

Among nineteen discrete risks shown across five dimensional categories, three critical vulnerabilities appear as fundamental determinants of system performance:

A. The Physical Infrastructure Constraint: Draft Depth Limitation
B. The Institutional Governance Deficit: Systemic Corruption
C. The Process Fragmentation: Digital and Coordination Deficit

6.3 TOP STRATEGIC PRIORITIES FOR TRANSFORMATION

Strategic prioritization requires showing the few vital interventions that unlock system-level performance improvement:

- Priority One: Draft Deepening to 12-14 Meters
- Priority Two: Digital Integration and Single Window Implementation
- Priority Three: Private Terminal Acceleration with Governance Reform

6.4 IMPLEMENTATION FRAMEWORK: FROM STRATEGY TO EXECUTION

Phased Implementation with Clear Milestones

Phase 1: Immediate Actions (0-12 months)

- Deploy gate automation systems (OCR, RFID, weighbridges)
- Establish Maritime Coordination Council
- Accelerate 12-meter draft deepening.
- Begin Digital Single Window platform development.

Phase 2: Short-term Priorities (1-3 years)

- Achieve 12-meter draft depth.
- Commission private terminal operations (APM, RSGT, DP World)
- Implement fully integrated Digital Single Window
- Deploy shore power infrastructure.

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Phase 3: Medium-term Transformation (3-5 years)

- Achieve 14-meter draft depth.
- Reach 5-6 million TEU annual capacity.
- Reduce customs clearance to 3-5 days consistently.
- Establish Bangladesh as competitive regional gateway.

Phase 4: Long-term Strategic Positioning (5-10 years)

- Evaluate deep-water port development.
- Meet IMO 2050 net-zero emissions targets.
- Establish world-class maritime logistics performance.

6.5 CRITICAL SUCCESS FACTORS

Success depends on four integrated elements:

A. **Institutional Alignment:** Unified governance and synchronized digital systems ensuring multiplicative impact across all agencies.
B. **Resource Mobilization:** Private capital mobilization, development financing, and transparent long-term investment commitments
C. **Performance Management:** Performance metrics, public dashboards, independent evaluation, and consequence mechanisms for sustained momentum
D. **Implementation Safeguards:** Cross-party consensus, statutory reform protection, and comprehensive change management to overcome resistance.

6.6 THE WINDOW OF OPPORTUNITY

Bangladesh's maritime sector has reached a critical turning point. Survey respondents from diverse organizations agree on the problems and solutions this consensus creates a rare opportunity for meaningful change. The recent political transition opens doors for reforms that established interest groups might have previously blocked.

However, windows of opportunity close:

- Stakeholder consensus dissipates if implementation does not materialize.
- Political will diminishes without visible progress.
- Reform momentum stalls if early initiatives achieve insufficient results.
- Competitive disadvantage becomes permanent if action is delayed.

What Transformation Requires:

- Political courage to confront entrenched interests.
- Financial resources to fund infrastructure investment.
- Institutional capacity to implement complex changes.
- Sustained commitment across multiple years.

These requirements are demanding but possible.**The Central Question:**

Does Bangladesh have the collective will to transform maritime logistics from national liability into competitive advantage before the window of opportunity closes and competitive disadvantage becomes permanent structural reality?

The current moment demands immediate, decisive action rather than extended deliberation.

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CHAPTER 7: REFERENCES & APPENDIX

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Appendix:

Survey Title: Strategic Risks and Constraints Affecting Bangladesh's Maritime Supply Chain

Survey Administration Details:

- **Survey Period:** November 15 - December 1, 2025
- **Administration Method**: Online (Google Forms)
- **Target Population:** Shipping Companies/Agents and Terminal Operators at Chattogram Port
- **Total Respondents:** 10 (N=10)

SURVEY QUESTIONNAIRE

SECTION A: QUANTITATIVE RISK ASSESSMENT (LIKERT SCALE QUESTIONS)

Q1. Port Congestion Severity To what extent does port congestion pose a risk to vessel operations at Chattogram Port?

Scale	1	2	3	4	5
Rating	Minimal	Low	Moderate	High	Critical

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Q2. Frequency of Unofficial Payments How often are unofficial payments or facilitation fees requested during port operations?

Scale	1	2	3	4	5
Rating	Never	Rarely	Sometimes	Frequently	Very Frequently

Q3. Port Community System (PCS) Effectiveness How effective is the current PCS in reducing documentation and clearance time?

Scale	1	2	3	4	5
Rating	Very Ineffective	Ineffective	Neutral	Effective	Very Effective

Q4. Cargo Damage/Loss Frequency How frequently does cargo damage or loss occur due to port handling or storage conditions?

Scale	1	2	3	4	5
Rating	Very Ineffective	Ineffective	Neutral	Effective	Very Effective

Q5. Transportation Infrastructure Availability How would you rate the availability of reliable and affordable transportation options (road, rail, inland waterway) from Chattogram Port to inland destinations?

Scale	1	2	3	4	5
Rating	Very Poor	Poor	Average	Good	Excellent

Q6. Environmental Management Practices How would you rate environmental management practices at Chattogram Port?

Scale	1	2	3	4	5
Rating	Very Poor	Poor	Average	Good	Excellent

Q7. Tariff Competitiveness How competitive are Chattogram Port's tariffs compared to other regional ports (e.g., Singapore, Port Klang)?

Scale	1	2	3	4	5
Rating	Much More Expensive	Slightly More Expensive	About the Same	Slightly More Competitive	Much More Competitive

SECTION B: BINARY ASSESSMENT QUESTIONS (YES/NO)

OPERATIONAL CHALLENGES AND INFRASTRUCTURE ASSESSMENT

Q8. Customs Clearance Delays | ☐ Yes | ☐ No

Q9. Supply Chain Disruptions (Political/Strikes) | ☐ Yes | ☐ No

Q10. Deep-Sea Port Impact on Competitiveness | ☐ Yes | ☐ No | ☐ Maybe

Q11. Shore-to-Ship Power Connection Availability | ☐ Yes | ☐ No | ☐ Maybe

SECTION C: QUANTITATIVE COST ASSESSMENT

Q12. Additional Cost Impact (% of base freight cost)

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SECTION D: QUALITATIVE ASSESSMENT AND STRATEGIC RECOMMENDATIONS

Operational Risks

Q13. Three Most Significant Risks & Mitigation Strategies

Infrastructure Priorities

Q14. Critical Infrastructure Improvements *(Select all)* ☐ Deepening/Widening Channels | ☐ Modern Container Equipment | ☐ Storage Facilities | ☐ Digital Infrastructure | ☐ Road/Rail Connectivity | ☐ Other: _____

Comparative Analysis

Q15. Regional Port Comparison *(Chennai, Mumbai, Jakarta, Surabaya, Laem Chabang)*

Q16. Best Practices from Advanced Ports *(Singapore, Rotterdam, Shanghai)*

Digital Transformation

Q17. Single-Window System Barriers *(Select all)* ☐ Infrastructure Upgrade | ☐ Regulatory Alignment | ☐ Stakeholder Readiness | ☐ Financial Investment | ☐ Resistance to Change | ☐ Other: _____

Governance Framework

Q18. Multi-Stakeholder Roles *(Government, Port Authority, Private Sector)*

Q19. Enterprise Risk Management Framework *(Singapore MPA Model)*